First Class Mail
Date Mailed December 14, 2004 Atty. Docket/ 2022645-7002452001
22645-7085

Applicant(s): James M. KATES
Title: DYNAMIC RANGE COMPRESSION USING DIGITAL FREQUENCY WARPING
Serial No.: 10/008,268 Filing Date: November 13, 2001

MAIL STOP AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SIR: Please place the U.S. Patent and Trademark Office date stamp hereon to acknowledge receipt of the following:

1. Return Receipt Postcard
2. Response Transmittal with authorization to charge fees and Certificate of Mailing 1 page)
3. Amendment After Final (8 pages)

OC/208963.1

First Class Mail
Date Mailed December 14, 2004 Atty. Docket/ 2022645-7002452001
22645-7085

Applicant(s): James M. KATES
Title: DYNAMIC RANGE COMPRESSION USING DIGITAL FREQUENCY WARPING
Serial No.: 10/008,268 Filing Date: November 13, 2001

MAIL STOP AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SIR: Please place the U.S. Patent and Trademark Office date stamp hereon to acknowledge receipt of the following:

1. Return Receipt Postcard
2. Response Transmittal with authorization to charge fees and Certificate of Mailing 1 page)
3. Amendment After Final (8 pages)

OC/208963.1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	
James M. Kates	**Confirmation:** 2619
Serial No.: 10/008,268	**Group Art Unit:** 2643
Filed: November 13, 2001	**Examiner:** Ni, Suhan
For: DYNAMIC RANGE COMPRESSION USING DIGITAL FREQUENCY WARPING	

RESPONSE TRANSMITTAL

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Transmitted herewith is an Amendment After Final (8 pages) to Office Action, mailed October 29, 2004, for the above-identified application.

The Commissioner is hereby authorized to charge any fees which may be required to Deposit Account No. 50-2518, Docket No. 2022645-7002452001 (22645-7085).

DATE: December 14, 2004

Respectfully submitted,

By: _____
Michael J. Bolan,
Registration No.: 42,339

Bingham McCutchen LLP
Three Embarcadero Center, Suite 1800
San Francisco, California 94111

CERTIFICATE OF MAILING

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the United State Postal Service on the date shown below with sufficient postage as First Class Mail in an envelope addressed to the Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

December 14, 2004
Date of Deposit

_____
Jocelyn L. Lee

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	**Confirmation No.:** 2619
James M. Kates	**Group Art Unit:** 2643
Serial No.: 10/008,268	**Examiner:** Ni, Suhan
Filed: November 13, 2001	
For: DYNAMIC RANGE COMPRESSION USING DIGITAL FREQUENCY WARPING	

AMENDMENT AFTER FINAL

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This letter is responsive to the Final Office Action dated October 29, 2004. Pursuant to 37 C.F.R. §1.116(a), Applicants respectfully request entry of this amendment, which, if entered, will place the application in condition for allowance or in better form for appeal.

CERTIFICATE OF MAILING

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as First Class Mail in an envelope addressed to the Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

December 14, 2004
Date of Deposit

Jocelyn L. Lee

CLAIM AMENDMENTS

1. (Currently Amended) A hearing aid, comprising:

an input signal channel having a microphone and providing digital input signals;

a signal path adapted to process said digital input signals in accordance with a ~~predetermined~~ hearing impairment correction signal processing algorithm to produce a digital output signal, wherein said signal path further comprises at least one signal processing function operating on a warped frequency scale; and

an output conversion means adapted to convert said output signals to an audio output.

2. (Original) The hearing aid of claim 1, wherein said at least one signal processing function further comprises a plurality of cascaded all-pass filters.

3. (Original) The hearing aid of claim 1, wherein said warped frequency scale approximates a Bark scale.

4-29. (Cancelled)

30. (Original) A hearing aid, comprising:

an input signal channel providing digital input signals;

an input data buffer, said input data buffer holding a block of data of size M comprised of a portion of said digital input signals;

a plurality of cascaded all-pass filters comprised of 2M cascaded all-pass filters, wherein a first block of said digital input signals pass from said input data buffer through said plurality of cascaded all-pass filters to form a first sequence of delayed samples and wherein a second block of said digital input signals pass from said input data buffer through said plurality of cascaded all-pass

filters to form a second sequence of delayed samples, and wherein said first sequence of delayed samples and said second sequence of delayed samples form a combined sequence of delayed samples;

means for windowing a first portion of said combined sequence of delayed samples, wherein said first portion is of size M, wherein a windowed sequence of delayed samples results from said windowing means;

means for applying a 2M-point frequency domain transform on said windowed sequence of delayed samples, wherein a warped sequence results from said frequency domain transform applying means;

means for calculating a plurality of frequency domain level estimates of said warped sequence;

means for calculating a plurality of frequency domain gain coefficients from said plurality of frequency domain level estimates;

means for applying an inverse frequency domain transform on said plurality of frequency domain gain coefficients, wherein a set of compression filter coefficients of a compression gain filter result from said inverse frequency domain transform applying means; and

means for convolving a second portion of said combined sequence of delayed samples with said compression filter coefficients, wherein said second portion is of size M, wherein a digital output signal results from said convolving means.

31. (Previously Presented) The hearing aid of claim 30, further comprising a hearing aid, wherein the dynamic range compressor is incorporated within said hearing aid.

32. (Previously Presented) The hearing aid of claim 30, wherein said plurality of frequency domain gain coefficients comprise a warped time-domain filter.

33. (Previously Presented) The hearing aid of claim 30, further comprising a digital-to-analog converter, said digital-to-analog converter converting said digital output signals to analog output signals.

34. (Previously Presented) The hearing aid of claim 33, further comprising an output transducer, said output transducer converting said analog output signals to an audio output.

35. (Previously Presented) The hearing aid of claim 30, said plurality of cascaded all-pass filters comprising a plurality of first order all-pass filters.

36. (Previously Presented) The hearing aid of claim 30, further comprising a digital processor, wherein said digital processor is adapted to provide said windowing means, said means for applying said 2M-point frequency domain transform, said means for calculating said plurality of frequency domain level estimates, said frequency domain gain coefficients calculating means, said inverse frequency domain transform applying means, and said convolving means.

37. (Previously Presented) The hearing aid of claim 30, wherein said means for applying said frequency domain transform uses a transform selected from the group consisting of discrete Fourier transforms, fast Fourier transforms, Goertzel transforms, and discrete cosine transforms.

38. (Previously Presented) The hearing aid of claim 30, further comprising:

an input transducer, said input transducer converting audio input signals to analog input signals; and

an analog-to-digital converter, said analog-to-digital converter converting said analog input signals to said digital input signals.

39. (Previously Presented) The hearing aid of claim 30, further comprising:

a digital-to-analog converter, said digital-to-analog converter converting said digital output signals to analog output signals; and

an output transducer, said output transducer converting said analog output signals to an audio output.

40. (Original) A method of processing sound in a hearing aid, comprising the steps of:

receiving digital input signals;

passing a portion of said digital input signals through a plurality of cascaded all-pass filters to form a sequence of delayed samples;

windowing said sequence of delayed samples;

applying a frequency domain transform to said windowed sequence of delayed samples to form a warped sequence;

calculating a plurality of frequency domain level estimates from said warped sequence;

calculating a plurality of frequency domain gain coefficients from said plurality of frequency domain level estimates to form a warped time domain filter;

applying an inverse frequency domain transform on said plurality of frequency domain gain coefficients to form a set of compression filter coefficients; and

convolving said sequence of delayed samples with said compression filter coefficients to form a digital output signal.

41. (Previously Presented) The hearing aid of claim 1, wherein the hearing aid is configured to be mounted on the ear of a user.

42. (Previously Presented) The hearing aid of claim 1, wherein the hearing aid is an in-the-canal hearing aid.

43. (Previously Presented) The hearing aid of claim 1, wherein the hearing aid is an in-the-ear hearing aid.

44. (Previously Presented) The hearing aid of claim 1, wherein the hearing aid is a behind-the-ear hearing aid.

REMARKS

Claims 1-3 and 30-44 are pending in this application, claims 1-3 and 42-44 of which stand rejected, and claims 30-40 of which have been allowed. Based on the foregoing amendments and following remarks, entry of this amendment, and reconsideration and allowance of this application is respectfully requested.

Claims 1-3 and 41-44 stand rejected under 35 U.S.C. §103, as being obvious over U.S. Patent No. 5,698,807 ("Massie"). Applicant respectfully traverses this rejection, since Massie does not disclose the combination of elements required by these claims, as amended.

Although Applicant disagrees that there is any suggestion to incorporate a microphone within the device of Massie, or to transform the Massie device into a hearing aid worn in or on a user's ear, Applicant has amended independent claim 1 to clarify that the signal processing algorithm contained within the hearing aid addresses a hearing impairment. Thus, the claimed invention is clearly distinguished from the Massie device, which, in contrast, uses a signal processing algorithm that corrects the pitch in recorded sounds.

Thus, Applicant submits that independent claim 1, as well as the claims depending therefrom (claims 2-3 and 41-44), are not obvious over Massie, and as such, respectfully request withdrawal of the rejections of these claims.

Conclusion

Based on the foregoing, it is believed that, with entry of this amendment, all claims are allowable, and thus, a Notice of Allowance is respectfully requested. If the Examiner has any questions or comments regarding this amendment, the Examiner is respectfully requested to contact

the undersigned at (714) 830-0600.

Respectfully submitted,

BINGHAM MCCUTCHEN LLP

Dated: December 10, 2004

By: _____
Michael J. Bolan
Reg. No. 42,339

Bingham McCutchen LLP
Three Embarcadero Center
San Francisco, California 94111
Customer No. 23639